



Research Article

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# Effect of Commercial and Homemade Feed on Milk Production on Dairy Farmers' Farms in Mezam Division, North-West Region Cameroon



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## Abstract

The purpose of this research was to evaluate milk production of lactating Holstein Friesian cows in relation to the feeding practices by dairy farmers in three Sub Divisions in Mezam Division, Northwest region of Cameroon. The research was conducted from 5th March to 2nd May 2022. A multistage sampling technique was used for this study. 16 farms were used out of 32 enlisted; 08 experimental farms and 08 control farms. Lactating cows were fed commercial feed (treatment) and homemade feed (control) alongside forage for a period of 6 weeks. The cows were fed twice daily with water adlib. Results showed a significantly higher ( $p < 0.05$ ) mean commercial feed given to the cows as compared to the homemade feed with mean  $6.183 \pm 1.2534\text{kg}$  and  $5.561 \pm 2.0709\text{kg}$  respectively,  $t = 69.811$ ,  $p = 0.000$ . Similarly, the average daily milk production for the cows fed with commercial feed was significantly higher ( $p < 0.05$ ) than that for cows fed with homemade feed ( $13.839\text{L} \pm 6.4546\text{L}$  and  $12.294\text{L} \pm 3.1395$  respectively,  $t = 124.554$ ,  $p = 0.000$ ). On the average, animals that were less than 60 months of age produced more milk irrespective of the feed. Also, cows in the second parity produced more milk irrespective of the type of feed consumed. It can be concluded that, milk production in lactating Holstein Frisians is greatly influenced by the concentrate (complete compounded) feed plus forage fed during lactation. Farmers here can only improve on the milk production of their cows if feed remains subsidized at the cost of 0.417USD (250FCFA) per kg.

**Key Words:** Holstein Friesians; Feeding; Lactation; Milk production; Mezam Division

**Abbreviations:** NWLDF: North West Livestock Development Fund; SPSS: Statistical package for social sciences

## Introduction

Good nutrition is the fundamental requirement for all farm animals and it is considered as one of the biggest contributors to animal productivity [1]. Dairy farming represents one of the fastest returns for livestock keepers in the developing world [2]. In zero-grazing conventional systems, Holstein Friesian cows have higher milk yields compared to other breeds [3, 4]. Semi intensive systems of dairy production are common in peri-urban zones owned by individuals with some degree of intensification by a combination of grazing and concentrate feeding [5]. The increase in milk yield potentials within many dairy cow populations has been accompanied by a corresponding increase in concentrate feeding; as such feeding concentrates to cows based on their specific requirements for milk production would result in their energy requirements for milk production being more closely met [6]. The amount of milk to be produced is highly influenced by the quantity and quality of the feed given to the cow [7].

Improved and sustainable milk production depends on the availability of good pasture, feed and water which are crucial especially in the dry season. To achieve this, emphasis must be laid to improved fodder and feed production, fodder conservation and the use of cheap dairy feed mixtures, based on the available different feed ingredients [8]. Feed quantity and quality are the major factors contributing to efficient and profitable dairy farming especially in small dairy farms [9]. They constitute the largest running cost in intensive milk production units and more than two thirds of such feed is fed to the group of lactating cows [10]. However, the greater cost of concentrates compared with forage means it is important that concentrates are used efficiently [11]. Feeding level, ration/nutrient composition and energy concentration are known to affect production [10]. Cows with high genetic potential for milk yield exhibit better responses to supplements [12].

Holstein Friesians with high genetic potential for milk production are imported in to Cameroon in an attempt to make up for the shortfall in milk production. In Cameroon, [13] observed a low milk production despite feed supplementation. However, preliminary discussion with some dairy farmers indicated that the cost of feeding dairy cattle is high with insignificant increase in milk produced. Because feed cost constitutes 60-70% of production costs, this study sets to evaluate feeding practices on farmers' farms and the effect on milk production. Findings from this study will add knowledge on the actual quantity of feed that will yield optimum milk production in small dairy farms with Holstein Friesian cows in Mezam Division.

## Materials and Methods

### Study area

This study was carried out in the Mezam Division of the North West Region. Mezam is located between latitudes 5°20' and 6°15'N and longitudes 09°7' and 10°21'East. It has an approximate land surface area of 1,841 km<sup>2</sup> and a population of about 446,000 inhabitants. The area has a tropical montane climate characterized by cold, cloudy and misty weather in areas with elevations above 1800m and a hot and humid weather in areas with elevations below 1800 m. The rainy season runs from mid-March to mid-November. The rest of the year is a dry season. Average annual rainfall is 2288mm. Higher elevations receive higher rainfall. The average

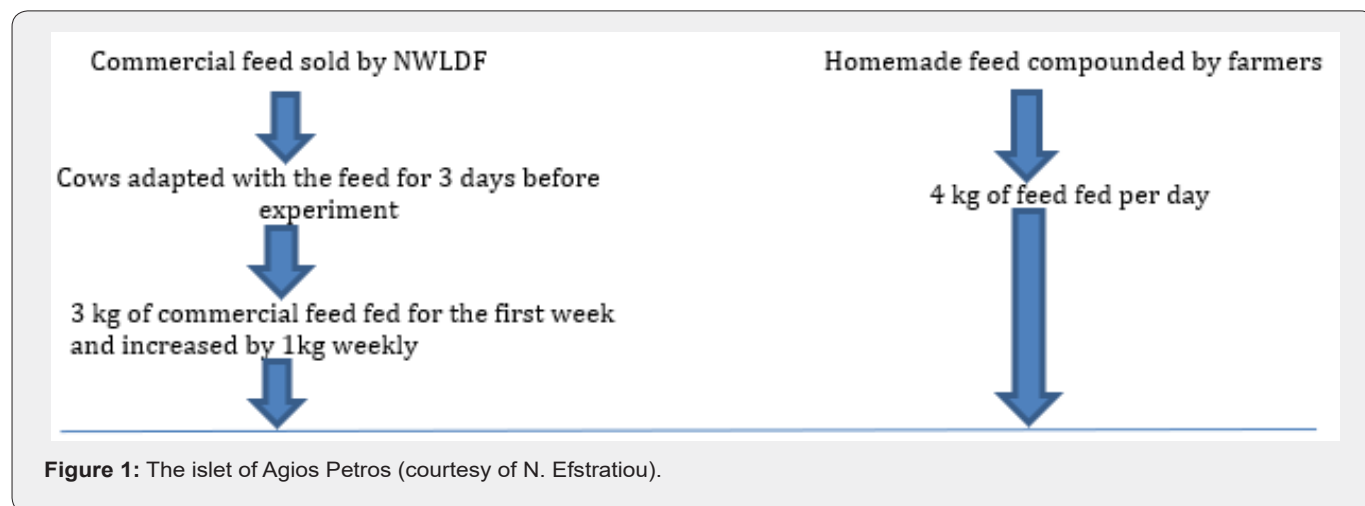
annual temperature is 19.7°C and temperature ranges between 15°C to 25°C. Mezam Division is essentially grassland making it conducive for the success of dairy and ruminant farming. The types of forage species cultivated include; *Pennisetum pupureum* (Elephant grass), *Trypsacum laxum* (Gwatamala), *Brachiaria ruziziensis*, *Daucus carota* (Carrot leaves), *Desmodium intortum* and *leucaena leucocephala* (Leucaena). These contribute to the adaptation of dairy cattle and enhance milk production.

### Sampling

A multistage sampling technique was used for this study with three stages. In Mezam division, the three Sub-divisions (Santa, Tubah and Bamenda III) known for dairy production were incorporated in the study. In each sub division, selection of dairy farms was through simple random sampling technique.

Stage one involved selection of sixteen lactating Holstein Friesian cows randomly selected from a list of 32 lactating cows from small dairy farmers based on; age, health status of the animal, stage of lactation and weight. Stage two involved selection of eight animals selected from the sixteen selected in stage one giving a total of 16 milk producers interviewed for the study. The third and final stage involved the random division of the selected 16 lactating cows in to two groups of 8 cows each. Each group was then randomly allocated to diet regimes: control and test diets respectively.

### Experimental diets



### Sampling Technique

A pilot survey was made in order to gather information on lactating cows in the study dairy farms, from where sixteen lactating cows were then identified. Background information of farmers was collected using a structural designed questionnaire. Sixteen respondents were interviewed with pre-coded response choices (closed-ended questions). The questionnaire was designed to get information on dairy farmers, feeding practices

and milk collection. The questionnaire was administered through face-to-face interview. While administering questionnaires, direct observation on general milking technics and milk handling hygienic practices were also done and noted.

All cows were hand milked by the farmers twice daily and milk yields recorded after each milking.

Quantities of feed fed to the cows as well as the daily milk yield were recorded on designed data collection forms.

## Data analysis

Data was entered into an excel spread sheet then transferred into the SPSS software, version 25.0. Descriptive statistical analysis was performed to describe the cows involved in the experiment. Student t-test was used to: determine feed intake to milk produced and if the relationship between feeding patterns were significantly different from each other. Also to find out if the difference between animals fed commercial feed and those fed homemade feed means were significant or not. Both analyses were performed at the 95% confidence interval ( $\alpha = 0.05$ ). A P value of  $p < 0.05$  was considered significant.

## Results

### Background information of small dairy farmers

Most of the farmers used in the treatment were males (75%)

as compared to females (25%). More so, a majority of farmers used for the control were females (62.5%) as compared to their male counterparts. Results showed that sex of the farmer did not affect the feeding of the cows. There was no significant difference at  $p > 0.05$  in the ages in months of the cows fed commercial feed and, in the cows, fed homemade feed.

### Health status of animals

A greater proportion of the cows fed commercial feed as well as those fed homemade feed were of good health conditions. The distribution in figure 1 shows that a greater proportion of the cows fed commercial feed as well as those fed homemade feed were of good health conditions (close to 97% and over 88% respectively, Chi-square = 24.574,  $p = 0.000$ ). This and more can be seen in figure 1.

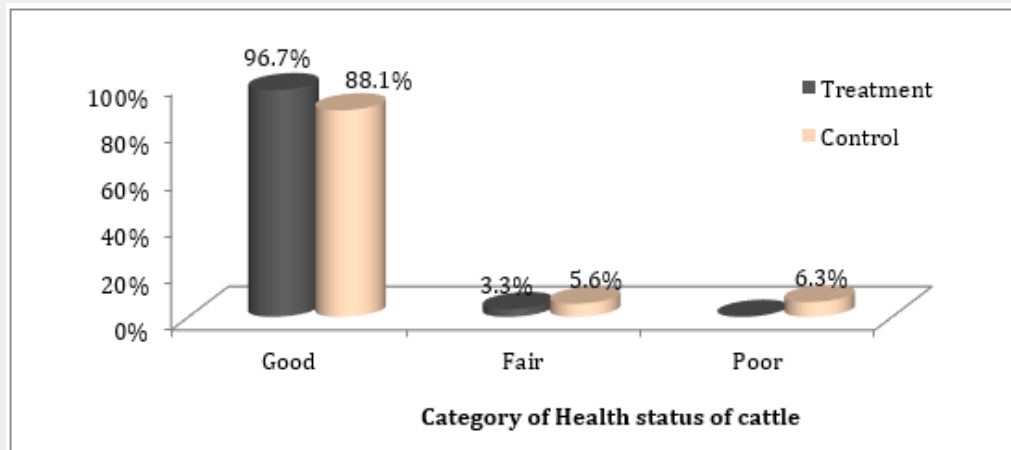


Figure 1: Health status of animals.

### Comparison of Commercial & Home-Made feed to milk produced

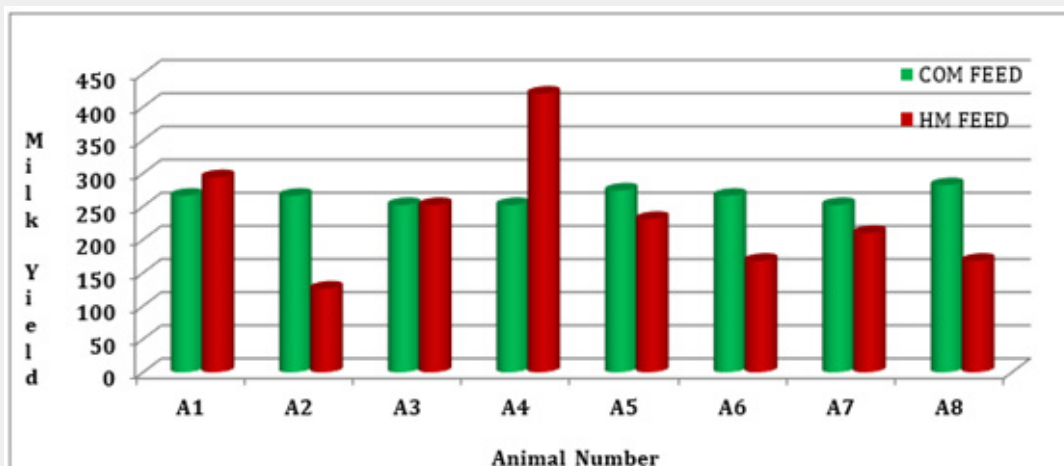


Figure 2: Comparison of Commercial and Home-Made feed to milk yield

\*NB: HM: Home Made

Generally, more feed was consumed by the cows fed commercial feed (2110kg) than those fed homemade feed (1869kg). Specific weekly feed consumed is shown in figure 4 with an average weekly consumption of commercial feed being 264kg/

cow while for homemade feed it was 234kg/cow. Results also showed a significant higher at  $p < 0.05$  means feed consumed for the commercial than homemade fed cows ( $6.183 \pm 1.2534$  kg and  $5.561 \pm 2.0709$  kg respectively). Details are presented in figure 2.

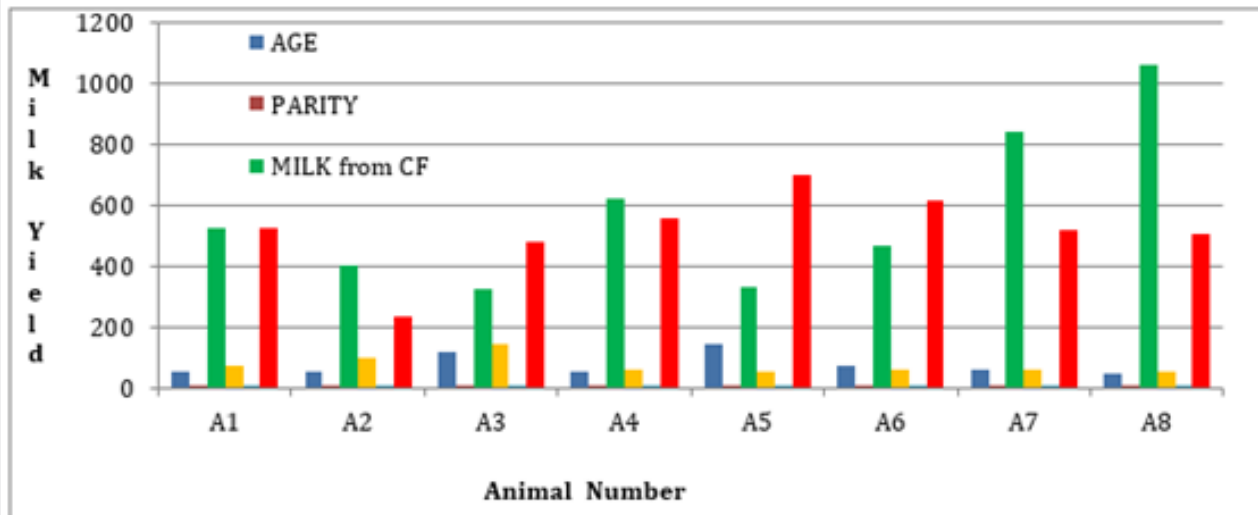


Figure 3: Age, parity and milk yield of cows fed commercial & HM feed

### Milk production of cows fed commercial and homemade feeds

Table 1 shows the distribution of milk produced for the cows fed commercial and homemade feeds respectively. Following t-test

(student's t-test), the results showed that there was a significantly higher average daily milk yield for the cows fed commercial feed than that for cows fed homemade feed ( $13.839 \pm 6.4546$  L and  $12.294 \pm 3.1395$  respectively,  $t = 124.554$ ,  $p = 0.000$ ).

Table 1: Milk production of cows fed commercial and homemade feeds

	Unit	Mean	Std. Deviation	Std. Error Mean	t-test
Milk produced	Commercial	13.839 <sup>a</sup>	6.4546	0.3511	$t = 124.554$ $p = 0.000$
per day/L	Homemade	12.294 <sup>b</sup>	3.1395	0.171	

a, b means with superscript significance at  $p < 0.05$

Total milk yield for cows fed with commercial feed was 4580liters while the yield for cows fed homemade feed was 4137liters. Specific weekly milk yields as shown in figure 5 with average weekly milk yield was 572.5l for cows fed with commercial feed while 517liters were produced by cows feed with homemade feed. Generally, more milk was produced by cows fed with commercial feed than those feed with homemade feed.

### Age, parity and milk yield of cows fed commercial & HM feed

On the average, animals that were less than 60months of age produce more milk irrespective of the feed. It was also observed that animals in the second parity produce more milk irrespective of the feed type of feed consumed. This is indicated on figures 3 below.

### Comparison of Commercial & Home-Made feed

The cost of producing homemade feed by the farmers was FCFA 260/kg while on the other hand the commercial feed produced by the NWLDF in table 2 above costs FCFA 317.5/kg. Adding up to a bag of 50kg, commercial feed would cost FCFA 15875 while homemade feed would be FCFA 13400. With this, results showed that the cost of commercial feed was FCFA 2475 higher than the cost of homemade feed.

With 1l of milk on the average currently valued at FCFA300, an analysis was conducted to find out the economic value of milk produced by cows under the different feeding conditions. Table 2 also indicates that there is a significant difference at  $p < 0.05$  in the fiscal value of milk produced under the different feeding

conditions (FCFA, 4150 for the commercial feed and FCFA, 3690 for the homemade feed,  $t = 124.554$ ,  $p = 0.000$ ). The cost of 1kg of homemade and commercial feed were 260FCFA and 317.5FCFA respectively indicating that the cost of commercial feed is 57.5FCFA higher than homemade feed calculated based on the current prices of feed ingredients. Result of cost benefit analysis

of the two feeding systems showed that feeding of lactating cows with homemade feed was more cost effective than with commercial feed based on the current prices of feed ingredients. On the other hand, buying subsidized dairy feed at 250FCFA/kg will give a difference of 2600FCFA.

**Table 2:** Comparison of Commercial & Home-Made feed.

Cost of homemade feed production				Cost of commercial feed produced by the NWLDF			
Item	Quantity kg	Unit cost FCFA	Total cost FCFA	Item	Quantity kg	Unit cost FCFA	Total cost FCFA
Maize	45	200	9000	Powdered Maize	54	200	10800
Wheat bran	40	125	5000	Wheat bran	12	125	1500
Cotton	10	500	5000	Cotton seed cakes	5	500	2500
Soya bean cake	5	500	2500	Soybean cake	10	500	5000
Bone	1	300	300	Bone meal	1	500	500
Limestone	1	1500	1500	Groundnut cake	8	500	4000
				Fish meal	5	600	3000
				Sea shell	2	500	1000
				Palm kernel cake	3	150	450
Grinding of maize	0	1000	1000	Grinding of maize	0	1000	1000
Transport	0	1000	1000	Transport	0	1000	1000
Labour	0	1000	1000	Labour	0	1000	1000
Total	103		26800	Total	100		31750

**Table 3:** Comparison of the cost of milk/l on commercial and homemade fed cows.

	Unit	Mean	Std. Deviation	Std. Error Mean	t-distribution
Daily income from milk	Commercial feed	4150 <sup>a</sup>	1940	105.326	$t = 124.554$
in FCFA	Homemade feed	3690 <sup>b</sup>	940	51.307	$p = 0.000$

a, b means with superscript are significant at  $p < 0.05$

**Table 4:** Cost benefit analysis for Commercial & Homemade feed based on current prices of feed ingredients

Feed/Milk	Av. Quantity of feed consumed	Av. Cost of feed FCFA
Commercial feed	6.183	1960
Milk yield	13.839	4150
Home Made feed	5.561	1450
Milk yield	12.294	3690

## Discussion

Semi-intensive systems of dairy production are a common practice in this peri-urban zones owned by individuals with some degree of intensification by a combination of grazing and concentrate feeding. Milk production is at small scale done for the purpose of food security with extra given as gift and some sold while little or no processing is practiced by a few individuals.

The increase in the quantity of feed for cows fed commercial feed is in line with [14,15] who stated that increase in the quantity

of concentrate increases the milk produced. The similarity in the feeding of cows by the male and female farmers is probably because they all know the importance of feeding dairy cows for milk yield. Furthermore, feeding concentrate separately from forage in both feeding regimes is in line with the work of [6] who observed that concentrate can be fed separately from forage. The higher daily milk production recorded by cows fed commercial feed as compared to those fed homemade feed is in line with [16] because there were higher proportions of nutrients in the commercial feed compared to the homemade feed.



The average milk yield of  $13.839 \pm 6.4546L$  in the study is contrary to results of  $14.22 \pm 0.29l$  per day obtained by [17]. This is probably because the experiment was conducted just following the harsh dry season which must have affected the animals. Although there was significant increase in milk produced by the cows fed commercial feed, it was still lower than in temperate climates. This confirms work of [18-20] that performance of exotic breeds is lower under hot environments.

The differences in milk produced in the different stages of lactation is in line with the observation made by [21] that milk yield gradually increases up to 90 days of lactation and remained high for a while and then declined in the later stage of lactation. The findings are contrary to those of [22] wherein their research concluded that the Holstein Friesian dairy cows have the highest production in the 4<sup>th</sup> lactation period, but there is a real difference in production when it enters the 6<sup>th</sup> lactation period due to the aging of the cows, so that the body's metabolic function was decreased. According to [23], milk production is closely related to the lactation period. In general, the length of the lactation period is influenced by the climate and environmental conditions, where Holstein Friesian dairy cows in cool areas had a longer lactation period than Holstein Friesian dairy cows in hot areas [24]. The Holstein Friesian dairy cows in this study area were adapted to the cold climate and environment probably reasons for the increase production as early as the second parity.

The cost benefit analysis of the two feeding systems (based on current prices of feed ingredients in the market) showed that feeding of lactating cows with homemade feed was more cost effective than with commercial feed. This is a clear indication that farmers are doing well with the feed they produce as a result of the knowledge they gained from HPI.

## Conclusion

Many types of feed ingredients were observed and used in the feeding of lactating Holstein Friesian cows. Feeding lactating cows with homemade feed based on the current prices of feed ingredients could be more cost effective than with commercial feed. Finally, farmers can only produce economically for optimum milk yield with commercial feed if the Government continues to subsidize the feed at FCFA 250/kg to the farmers. Farmers should start feeding their lactating Holstein Friesians with 6kg of concentrate feed together with at least 12-15kg of forage in order to ensure profitable milk yields. Given that the cost of commercial feed is higher than the cost of homemade feed, it would be better that the farmers compound their feed and increase the quantity fed to the cows in order to increase milk yield. More research is needed in the feeding of lactating Holstein Friesian cows based on the different stages of lactation, parity level and nutritional needs.

## Acknowledgement

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